

3.23 Powers & Roots of Complex Numbers

Name _____ Date _____ Period _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use De Moivre's theorem to simplify the expression. Write the answer in a + bi form.

1) $(3(\cos 30^\circ + i \sin 30^\circ))^3$ 1) _____

2) $(\sqrt{2}(\cos 120^\circ + i \sin 120^\circ))^4$ 2) _____

3) $(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12})^8$ 3) _____

4) $(\sqrt{6}(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}))^4$ 4) _____

Simplify each expression, by using trigonometric form and De Moivre's theorem.

5) $(2 + 2i)^3$ 5) _____

6) $(-3 - 3i\sqrt{3})^5$ 6) _____

7) $(2 + 3i)^4$

7) _____

8) $(2 - i)^4$

8) _____

Find the indicated roots. Write the answer in trigonometric form.

9) Cube roots of $8(\cos 30^\circ + i \sin 30^\circ)$

9) _____

10) Sixth roots of $64(\cos \pi + i \sin \pi)$

10) _____

Find all specified roots in the form $a + bi$. Check by graphing the roots in the complex plane.

11) Fourth roots of 16

11) _____

12) Cube roots of i

12) _____

Find all complex solutions to each equation. Write the answer in $a + bi$ form.

13) $x^3 + 1 = 0$

13) _____

14) $x^2 + 2i = 0$

14) _____